SECTION 11

AUXILIARY HYDRAULICS

AUXILIARY HYDRAULICS

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11B . 1 SPECIFICATION:

Auxiliary pump type	:	Gear type 10 X 4 with two sections for auxiliary hydraulics and IPTO
Pump output:		
Auxiliary	:	9.77 gpm (37 lpm)
I.P.T.O.	:	5.12 gpm (19.4 lpm)
Relief valve setting at 2000 engine rev/min:		
Auxiliary	:	175 bar (2538 psi)
I.P.T.O	:	60 bar (870 psi)
Filter	:	140 micron serving lift pump and auxiliary pump - Washable
Auxiliary pump drive	:	Plated drive gear train from lift pump.
Auxiliary control valves		
Make	:	REXROTH (BOSCH)
Types	:	Open centre three position, spring return to neutral (Both position) , proportional spool type sectional valve
Number of Sections	:	1 or 2
Flow at quick release coupling at 2000 engine rev/min at 124 bar:		
Auxiliary pump	:	9.51 gpm (36.0 lpm)
Pressure at Quick Release Couplings at 2000 engine rev/min:		
Auxiliary pump	:	170 - 190 bar (2466 - 2756 psi)
Special tools		
MF.3001	:	Pressure Test Kit
MF.3002	:	Hose Kit
MF.3003	:	Hydraulic Flow Meter
Bolt torques:		
Control valve stud nuts	:	13 lbf.ft (18 Nm)
Plated drive to pump bolts	:	21 lbf.ft (30 Nm)
Plated drive spacer nuts	:	20 lbf.ft (27 Nm)
Plated drive socket head screw	:	20 lbf.ft (27 Nm)
Pump relief valve	:	37 lbf.ft (50 Nm)
Pump end cover bolts	:	33 lbf.ft (45 Nm)

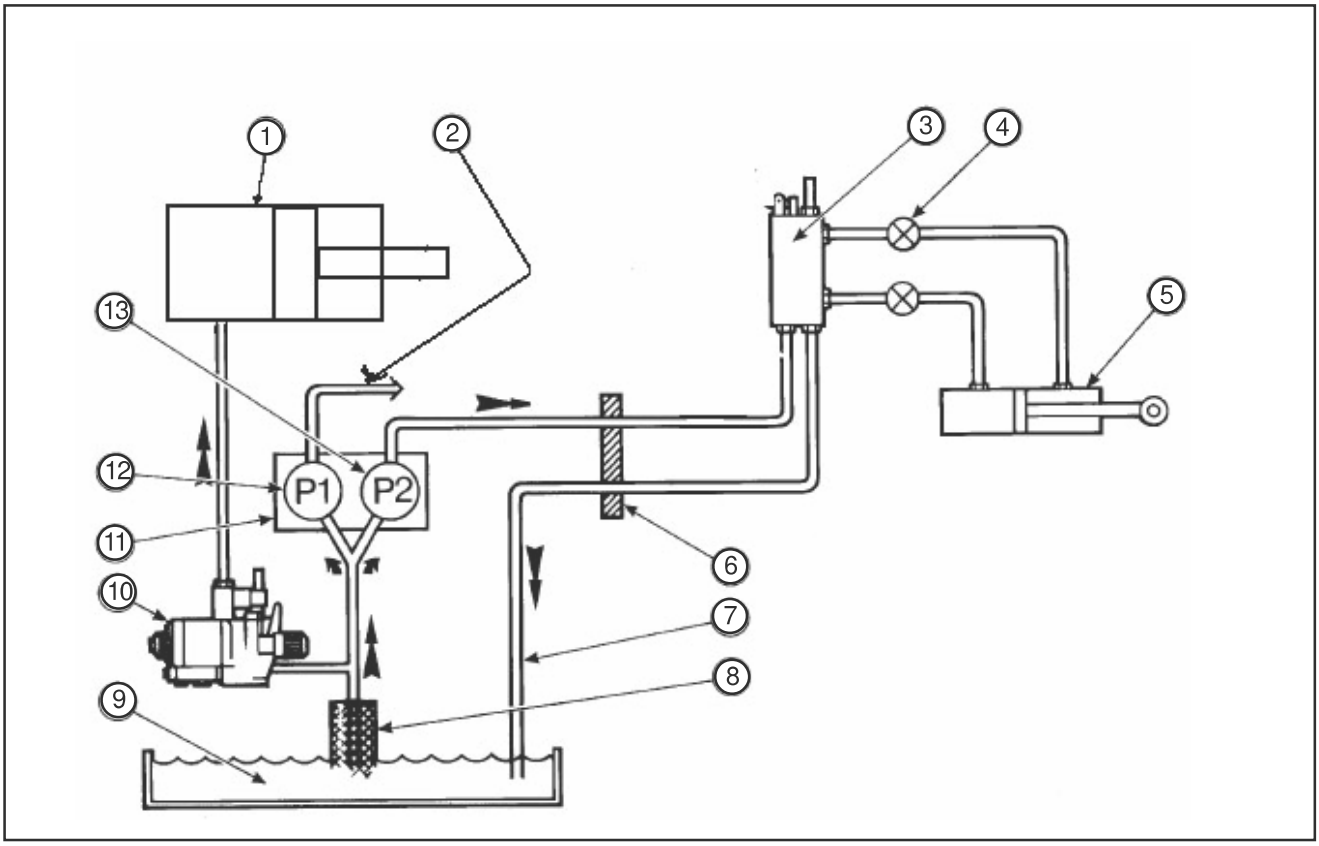

Fig 1

1. Ram cylinder.
2. Supply to IPTO clutch.
3. Hydraulic control valve.
4. Quick release coupling.
5. External hydraulic cylinder.
6. Left-hand side cover.
7. Return to transmission.
8. Suction strainer.
9. Transmission oil.
10. Ferguson lift pump.
11. Dual element pump.
12. P1 - IPTO section.
13. P2 - Auxiliary section.

11B . 2 GENERAL DESCRIPTION :-

The auxiliary hydraulic system is in two parts and is powered by a dual element auxiliary hydraulic pump driven from a plated drive in front of the hydraulic lift pump. The pump draws its oil through a special 140 micron filter attached to the lift pump and delivers oil at 9.77 gpm (37 lpm) to the auxiliary control valve. The second section supplies oil to the Independent Power Take-Off (IPTO) clutch at 5.124 gpm (19.4 lpm).

Auxiliary hydraulics

The oil supply from the pump is taken through the left-hand side cover to the auxiliary hydraulic control valve mounted behind the seat. This valve can be in either one or two sections . The following specification of control valve is available:

1. Three position, spring return to neutral.
2. Open centre three position, spring return to neutral (Both position) , proportional spool type sectional valve

A check valve is provided within the valve on the pressure side (pump side) which will not open until the pump pressure is greater than the pressure in the ram. This prevents the external ram from dropping before lifting. It also prevents the ram from dropping if the control valve is moved to the lift position when the engine is stopped. Oil from the control valve is conveyed to a series of quick release couplings at the rear of the tractor. Return oil from the control valve is returned through the left-hand side cover back to the transmission.

The operating pressure of 170 - 190 bar (2466 - 2756 psi) is controlled by a pressure relief valve built into the hydraulic pump.

11B . 3 CONTROL VALVE ASSEMBLY

Removal and refitment

Removal

1. Disconnect the feed, return outlet pipes and links from the control valve.
2. Remove the four attachment bolts, and lift off the control valve assembly.

Refitment

3. Reverse procedures 1 and 2

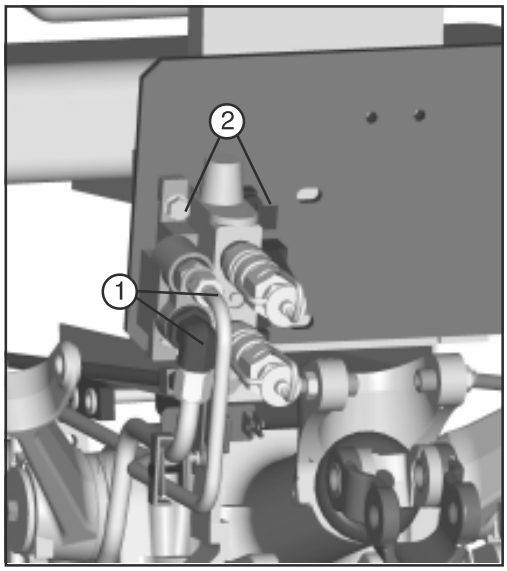

Fig 2

11B . 4 CONTROL VALVE SECTION

Removal and refitment

Removal

1. Remove the control valve unit from the tractor, see operation 11B . 3
2. Remove the four nuts and studs securing the control valve sections.
3. Remove the end plates, sectional valves, intermediate plates.
4. Remove the 'O' rings.
5. Thoroughly clean the mating faces of the control valve sections and end plates.

Refitment

6. Fit new 'O' rings to the recesses in the control valve sections.
7. Place the control valve sections on a flat surface with the feed ports up.
8. Align the valve sections and refit the studs, nuts and lockwashers.
9. Re-tighten the nuts to a torque of 13 lbf.ft (18 Nm).

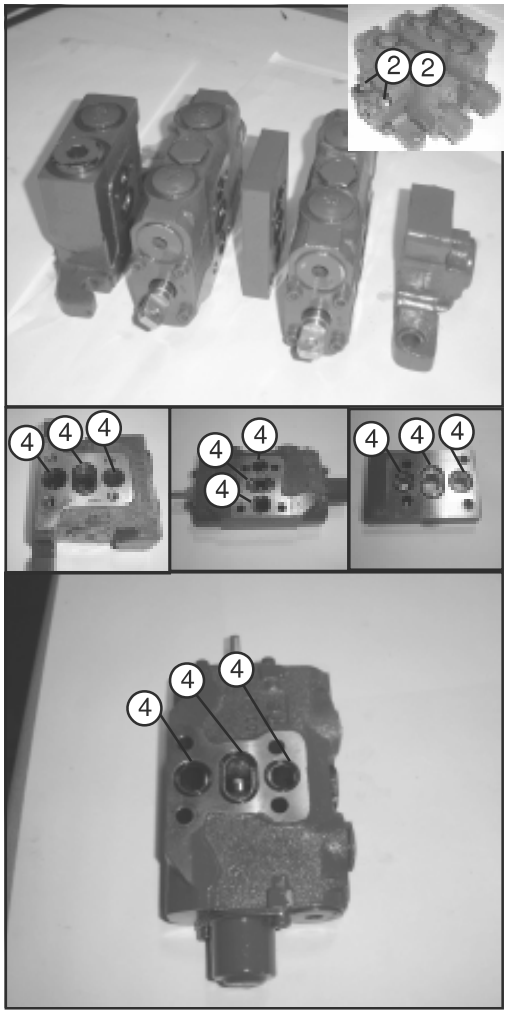

Fig 3

11B . 5 AUXILIARY PUMP FLOW AND PRESSURE TEST

Check

Special Tools:

MF3001 Pressure test kit

MF3002 Hose kit

MF3003 Hydraulic flow meter

Procedure

1. Connect the two hoses from the MF.3002 hose kit to the MF.3003 Flow Meter. Fit to each end of the hoses a quick release coupling that will fit the connections on the rear of the tractor.
2. Fit the flow meter inlet hose to the No. 1 coupler at the rear of the tractor.
3. Fit the outlet hose to the No. 2 coupler.
4. Connect the 300 bar (4351 psi) gauge in the MF.3001 pressure test kit to the test point on the flow meter.
5. Fully OPEN the flowmeter restrictor valve.
6. Start up the engine and warm-up the hydraulic system. The oil temperature must be 122 - 140°F (50-60 °C).
7. Set the engine speed to 2000 rev/min.
8. Move the control valve lever serving couplers numbers 1 and 2 rearwards and hold in this position.
9. Slowly screw-in fully the restrictor valve on the flow meter.
10. The pressure reading should be 170-190 bar (2466 - 2756 psi). The flow meter should read 9.510 gpm (36 lpm). Minimum accepted flow 8.453 gpm (32 lpm).

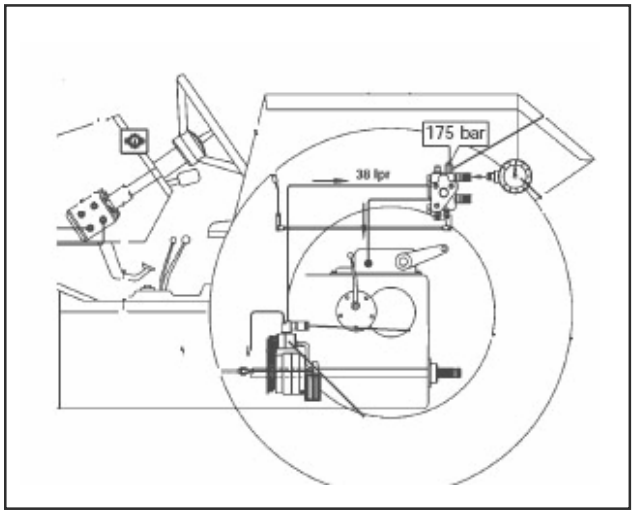

Fig 4

Diagnosis:

S.No.	Symptom - Auxiliary pump flow or pressure low	
	Cause	Action
1	Auxiliary pump worn	Replace pump or repair
2	Pressure relief valve faulty	Replace valve and reset
3	Control valve faulty	Overhaul valve
4	Quick release coulings blocked	Replace couplings
5	Suction strainer blocked	Clean strainer
6	Insufficient oil in transmission	Fill to level

11B . 6 AUXILIARY PUMP AND PLATED DRIVE

Removal and refitment

Removal

1. Remove the lift cover, see operation 11A . 5
2. Drain the transmission oil.
3. Split the tractor between the gearbox and spacer or centre housing, see operation 4A . 4
4. Disconnect the flexible pipe supplying the IPTO clutch.
5. Disconnect the pipe to the side cover.
6. Disconnect the pipe at the side cover and remove.
7. Remove the hydraulic lift and auxiliary pump filter.
8. Remove the two nuts and the dowel pins each side of the transmission case holding the lift pump.
9. Withdraw the hydraulic lift pump complete with plated drive and auxiliary pump from the front of the centre housing.

Auxiliary Pump

10. Place the lift pump, plated drive and auxiliary pump assembly on a bench, remove the external circlip holding the pump gear in place.
11. Remove the socket head setscrew.
12. Remove the two bolts and spacers.
13. Remove the auxiliary pump.
14. Remove the elbow between the auxiliary pump and the filter manifold.
15. Remove the auxiliary pump drive gear.

Plated Drive

16. Remove the two external retaining clip holding the plated drive to the hydraulic lift pump.
17. Withdraw the drive off the pump drive shaft.

Re-assembly

18. Reverse procedures 1 to 17 except:
    (a) Do not forget the elbow between the auxiliary pump and the filter manifold.
    (b) Tighten the two bolts and spacers to a torque of 21 lbf.ft (30 Nm), plated drive to pump.
    (c) Tighten the socket head cap screw to a torque of 20 lbf.ft (27 Nm), plated drive to pump.
    (d) Check the total backlash between the three gears, it must be between 0.0019 inch (0.05 mm) and 0.0161 inch (0.41 mm).
    (e) Refit the two external retaining clip holding the plated drive to the bottom left and top right nuts on the lift pump body.
    (f) Do not forget that the right hand dowel pin (8) is a tight fit while the left hand is an easy fit.

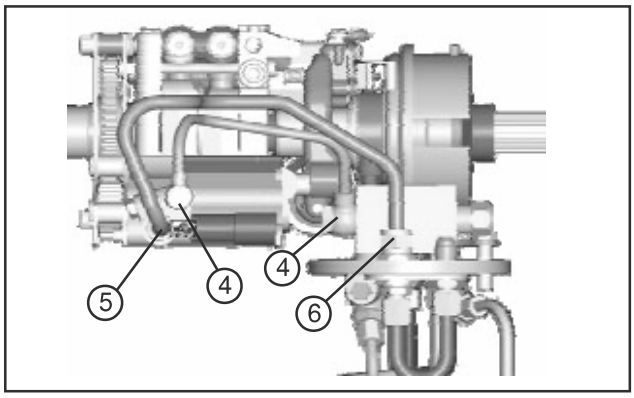

Fig 5

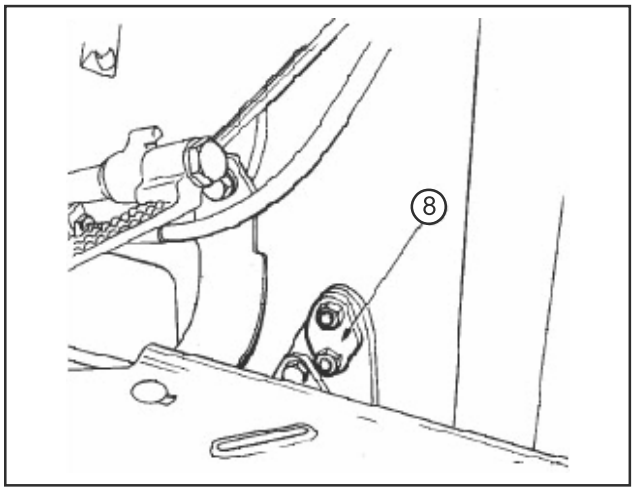

Fig 6

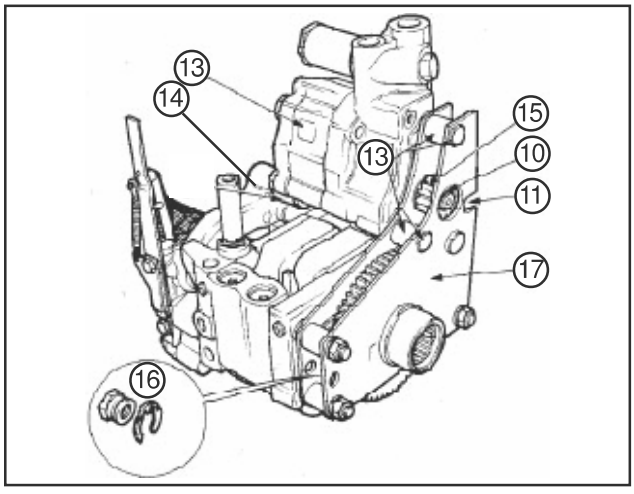

Fig 7

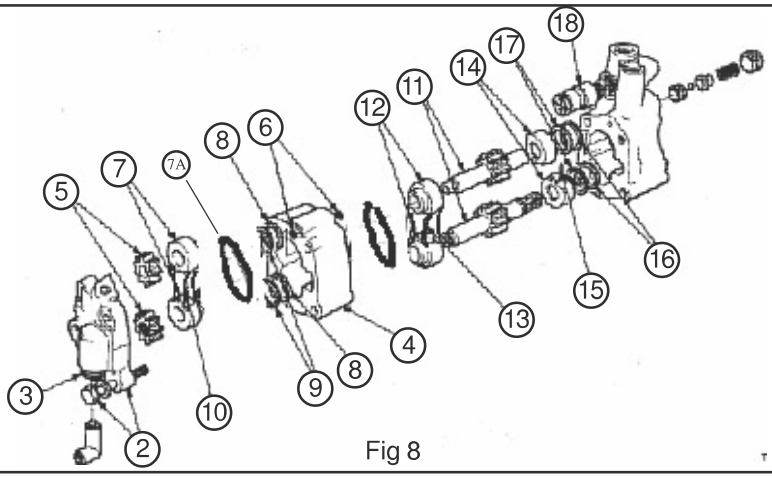

Fig 8

11B . 7 AUXILIARY HYDRAULIC PUMP

Overhaul

Dis-assembly

1. Remove the auxiliary pump, see operation 11B . 6.
2. Remove the four securing bolts and remove the end cover.
3. Remove the 'O' ring.
4. Withdraw the centre body section complete with gears off the drive shafts.
5. Remove the gears.
6. Remove the two 'O' rings.
7. Carefully, with finger pressure only, remove the centre section bearings, mark their position with a felt tip pen so they can be refitted in the original position.

7A. Remove the 'O' ring

8. Remove the seal support rings.
9. Remove the seals.
10. Separate the centre section bearings and remove the dowel pin.
11. Withdraw both shafts complete with bearings from the front body. DO NOT USE FORCE. Mark the bearings with a felt tip pen for refitment.
12. Remove the centre section bearings from the shafts.
13. Separate the bearings and remove the dowel pin.
14. Remove the bearings from the front body, see procedure 7.
15. Separate the bearings and remove the dowel pin.
16. Remove the seal support washers.
17. Remove the seals.
18. Remove the main relief valve, if necessary.

Examination

Bearings

Examine the bearings for wear on their faces and in their bores. During a major overhaul the bearings should be renewed, but if not badly worn they can be salvaged as follows:

Place a sheet of '0' grade emery paper, lubricated with paraffin on a true flat surface, e.g. a surface plate, or plate glass, then polish the bearing face, using a light rotary motion.

Bodies

Inspect the front and centre bodies for external damage and cracks. Examine the bodies for wear and damage. The gears will always cut a light track on the inlet side of the body bores. The depth of this track must not exceed 0.00019 inch (0,005 mm). The depth of the track can be very difficult to measure with such accuracy. If in doubt replace the body.

Gears

Examine the gears for scored or worn faces or journals, damaged teeth and surface cracks. Always fit replacement gears as a pair and never individually.

Bearing Seals and 'O' Rings .

Always fit new seals and 'O' rings on re-assembly.

Relief Valves

The two pressure relief valves are factory preset units, if the valve is suspect it is recommended that the entire unit be replaced.

Re-assembly:

19. Reverse procedure 1 to 18 except:

(a) Retighten the main relief valve to a torque of 37 lbf.ft (50 Nm).

(b) When rebuilding the pump DO NOT use unnecessary force, e.g. a hammer and drift. Using hand pressure only, gently ease the bearings into the bores until they have seated onto their seals.

(c) When replacing the front body bearings ensure that the uppermost bearing is fitted with its relieved face adjacent to the outlet port.

(d Measure the protrusion of the bearings above the joint face of the body. This dimension must lie between 0 - 0.0196 inch (0-0.5 mm) MAXIMUM. If the dimension falls below zero and the bearings become recessed renew the seals. If this dimension is above 0.0118 inch (0.3 mm) then the bearings have not seated correctly because of a slight seizure in the bores.

(e Measure the protrusion of the gear wheels from the centre body face. If the protrusion is not correct take action as detailed in the above paragraph.

(f) Retighten the end cover bolts to a torque of 33 lbf.ft (45 Nm).

(g) The drive shaft will be difficult to turn by hand when the pump is re-assembled. This condition is quite normal. Check for rotation by temporarily assembling a drive gear to the shaft and turn using a cloth wrapped around the gear.

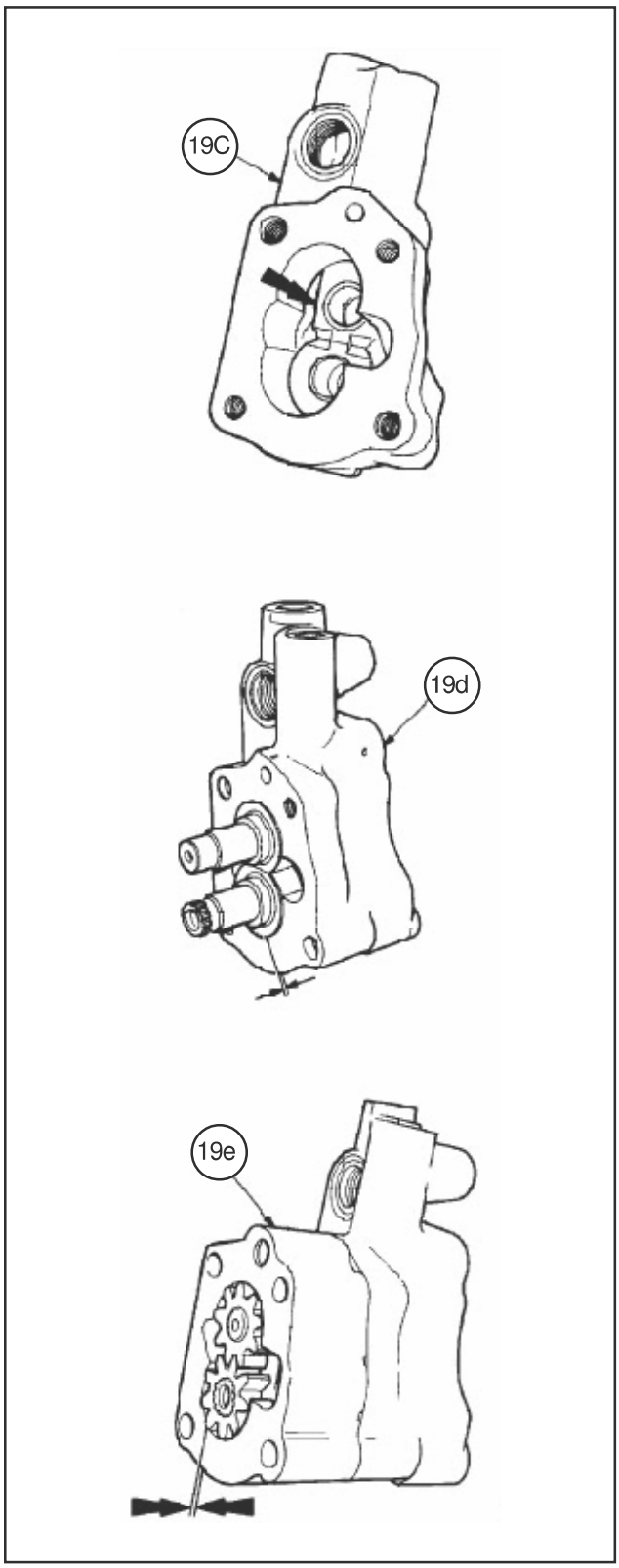

Fig 9

11B . 8 PLATED DRIVE

Overhaul

Dis-assembly

1. Remove the plated drive, see operation 11B . 6.
2. Remove the nuts and washers.
3. Remove the plate and spacers.
4. Lift out the drive gear and bushes.
5. Remove the idler gear, thrust washers and needle rollers.
6. Push the idler shaft complete with its circlip out of the side plate.

Examination

Check the gear teeth for wear, chipping, or other damage. Examine the bores of the gears, bushes and needle rollers for wear. Check the idler shaft and thrust washers for wear, scoring, or pitting.

Replace any defective components.

Re-assembly

7. Refit the idler shaft to the rear plate complete with circlip.
8. Fit a thrust washer to the idler shaft.
9. Replace the 22 rollers inside the idler gear using petroleum jelly; fit the gear and second thrust washer.
10. Refit the drive gear and bushes, ensure that the flats on the bush locate against the lugs on the plates to prevent rotation.
11. Refit the spacers, plate and nuts. Tighten the nuts progressively to 20 lbf.ft (27 Nm).
12. Refit the lift pump, plated drive and auxiliary pump assembly, see operation 11B . 6.

    Check that the flat on the end of the idler gear shaft locates correctly to the bottom of the auxiliary pump.

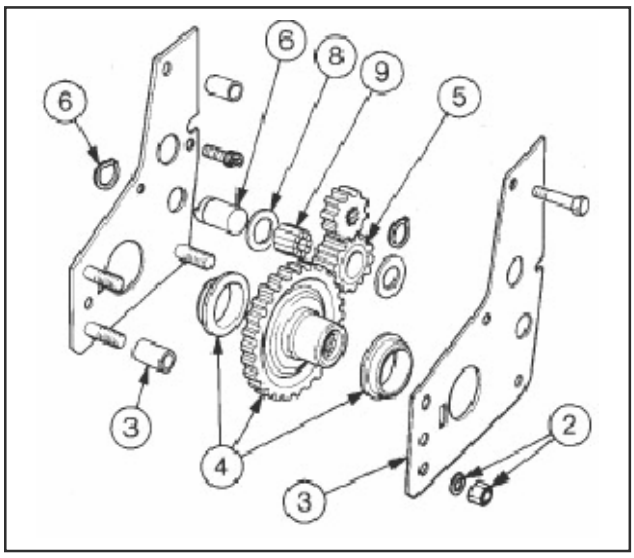

Fig 10

11B . 9 HYDRAULIC LIFT AND AUXILIARY PUMP FILTER

Servicing

Procedure

Procedure

1. Drain the oil.
2. Remove the three bolts and washers securing the cover plate to the bottom of the centre housing.
3. Remove the cover plate.
4. Remove and discard the gasket.
5. Remove the clip.
6. Remove the nut.
7. Remove the spring.
8. Remove the washer.
9. Remove the 'O' ring.
10. Pull out the strainer.
11. Thoroughly clean the strainer in cleaning solvent and / or replace.
12. Re-assemble by reversing procedures 1 to 9 except:

    (a). Fit new 'O' ring.

    (b). Fit new cover plate gasket.

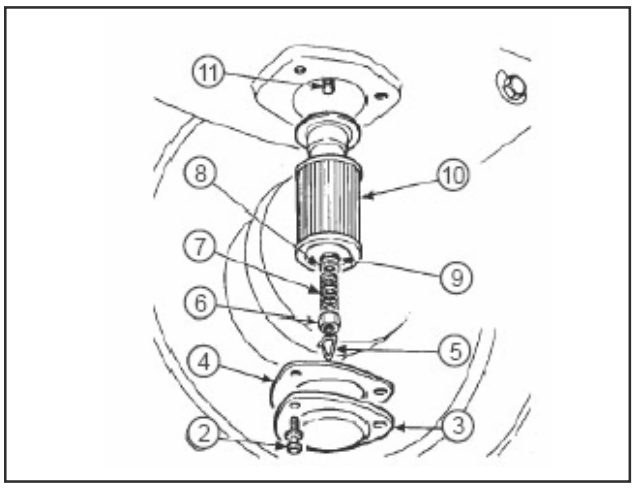

Fig 11